AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A drive circuit which produces a drive signal for a device having a piezoelectric actuator and applies the drive signal to the piezoelectric actuator, wherein the drive circuit is arranged to change dynamically the drive signal in dependence upon a sensed operational parameter of the device during real time operation of the device.

2. (Original) The apparatus of claim 1, wherein the drive circuit changes dynamically a shape of a waveform of the drive signal.

3. (Original) The apparatus of claim 1, wherein the drive signal comprises charge packets which are integrated by the piezoelectric actuator.

4. (Original) The apparatus of claim 1, wherein the drive circuit comprises a pulse width modulator which changes dynamically, during real time operation of the device, widths of pulses from which the drive signal is derived.

5. (Cancelled)

6. (Cancelled)

7. (Currently Amended) The apparatus of claim ~~6~~1, wherein the sensed operational parameter of the device is resonance of the piezoelectric actuator.

8. (Currently Amended) The apparatus of claim ~~6~~1, wherein the sensed operational parameter of the device is temperature.

9. (Original) The apparatus of claim 1, wherein the drive circuit changes dynamically the drive signal in dependence upon a sensor signal which is obtained from a sensor.

10. (Original) The apparatus of claim 9, wherein the sensor signal bears an indication of resonance of the piezoelectric actuator.

11. (Original) The apparatus of claim 9, wherein the sensor signal bears an indication of temperature.

12. (Original) The apparatus of claim 1, wherein the drive circuit changes dynamically one of voltage and frequency of the drive signal.

13. (Original) The apparatus of claim 1, wherein the drive circuit changes dynamically one of voltage and frequency of the drive signal in accordance with an input signal to the drive circuit.

14. (Original) The apparatus of claim 13, wherein the input signal is obtained from a user input device.

15. (Original) The apparatus of claim 1, wherein the device is a pump.

16. (Original) The apparatus of claim 15, wherein the drive circuit changes dynamically the drive signal whereby the drive signal varies over time so that an essentially non-continuous dosage of fluid is delivered by the pump.

17. (Original) The apparatus of claim 16, wherein the drive circuit changes dynamically the drive signal whereby the drive signal varies over time so that an essentially non-continuous intermittent dosage of fluid is delivered by the pump.

18. (Withdrawn) A drive circuit which produces a digital drive signal for a device having a piezoelectric actuator, wherein the drive circuit is arranged to generate the drive signal in accordance with an analog input signal to the drive circuit.

19. (Withdrawn) The apparatus of claim 18, wherein the drive circuit is arranged to change dynamically the drive signal in accordance with the analog input signal to the drive circuit.

20. (Withdrawn) The apparatus of claim 18, wherein the analog input signal to the drive circuit is acquired from a sensor.

21. (Withdrawn) The apparatus of claim 20, wherein the analog input signal bears an indication of resonance of the piezoelectric actuator.

22. (Withdrawn) The apparatus of claim 20, wherein the analog input signal bears an indication of temperature.

23. (Withdrawn) The apparatus of claim 18, wherein the analog input signal bears an indication of one of a desired voltage and a desired frequency of the drive signal.

24. (Withdrawn) The apparatus of claim 23, wherein the input signal is obtained from a user input device.

25. (Withdrawn) A drive circuit which produces a drive signal for a device having a piezoelectric actuator, wherein the drive circuit is arranged to generate the drive signal whereby a waveform of the drive signal is shaped in dependence upon an operational parameter of the device.

26. (Withdrawn) The apparatus of claim 25, wherein the drive circuit dynamically shapes the waveform of the drive signal in dependence upon the operational parameter of the device during real time operation of the device.

27. (Withdrawn) The apparatus of claim 25, wherein the drive signal comprises charge packets which are integrated by the piezoelectric actuator.

28. (Withdrawn) The apparatus of claim 25, wherein the drive circuit comprises a pulse width modulator which shapes widths of pulses from which the waveform of the drive signal is derived in dependence upon the operational parameter of the device.

29. (Withdrawn) The apparatus of claim 25, wherein the drive circuit shapes the waveform of the drive signal in dependence upon a sensed operational parameter of the device.

30. (Withdrawn) The apparatus of claim 29, wherein the sensed operational parameter of the device is resonance of the piezoelectric actuator.

31. (Withdrawn) The apparatus of claim 29, wherein the sensed operational parameter of the device is temperature.

32. (Withdrawn) A drive circuit which produces a drive signal for a device having a piezoelectric actuator, wherein the drive circuit is arranged to generate the drive signal whereby a waveform of the drive signal is shaped in dependence upon a sensor signal which is obtained from a sensor.

33. (Withdrawn) The apparatus of claim 32, wherein the drive circuit dynamically shapes the waveform of the drive signal in dependence upon the sensor signal of the device during real time operation of the device.

34. (Withdrawn) The apparatus of claim 32, wherein the drive signal comprises charge packets which are integrated by the piezoelectric actuator.

35. (Withdrawn) The apparatus of claim 32, wherein the drive circuit comprises a pulse width modulator which shapes widths of pulses from which the waveform of the

drive signal is derived in dependence upon the sensor signal which is obtained from the sensor.

36. (Withdrawn) The apparatus of claim 32, wherein the sensor signal bears an indication of resonance of the piezoelectric actuator.

37. (Withdrawn) The apparatus of claim 32, wherein the sensor signal bears an indication of temperature.

38. (Withdrawn) The apparatus of claim 32, wherein the sensor signal bears an indication of voltage.

39. (Withdrawn) The apparatus of claim 32, wherein the drive circuit changes voltage of the drive signal in accordance with the input to the drive circuit.

40. (Withdrawn) A drive circuit which produces a drive signal for a device having a piezoelectric actuator, wherein the drive circuit is arranged to generate the drive signal whereby one of voltage and frequency of the drive signal is determined in dependence upon an input signal to the drive circuit.

41. (Withdrawn) The apparatus of claim 40, wherein the input signal is obtained from a user input device.

42. (Withdrawn) The apparatus of claim 40, wherein the drive circuit dynamically changes the one of voltage and frequency of the drive signal during real time operation of the device.

43. (Withdrawn) The apparatus of claim 40, wherein the drive signal comprises charge packets which are integrated by the piezoelectric actuator.

44. (Withdrawn) A drive circuit which produces a drive signal for a pump having a piezoelectric actuator, wherein the drive circuit is arranged to generate the drive signal

whereby the drive signal varies over time so that an essentially non-continuous dosage of fluid is delivered by the pump.

45. (Withdrawn) The apparatus of claim 44, wherein the drive circuit dynamically changes the drive signal over time during real time operation of the pump whereby a differing dosage of fluid is delivered by the pump after the change.

46. (Withdrawn) The apparatus of claim 44, wherein the drive signal is a digital signal.

47. (Withdrawn) The apparatus of claim 44, wherein the drive circuit comprises a pulse width modulator which shapes widths of pulses from which the waveform of the drive signal is derived so that the drive signal varies over time.

48. (Currently Amended) A piezoelectric-actuated device comprising:

a piezoelectric actuator which is responsive to a drive signal; and

a drive circuit which produces the drive signal and applies the drive signal to the piezoelectric actuator, the drive circuit being arranged to change dynamically the drive signal in dependence upon a sensed operational parameter of the device during real time operation of the device.

49. (Previously Presented) The apparatus of claim 48, wherein the device is a pump having a pump body for at least partially defining a pumping chamber, wherein the piezoelectric actuator is situated in the pump body and responsive to the drive signal for pumping fluid in the pumping chamber; and wherein the drive circuit produces the drive signal, the drive circuit being arranged to change dynamically the drive signal during real time operation of the pump.

50. (Original) The apparatus of claim 49, wherein the drive circuit changes dynamically the drive signal whereby the drive signal varies over time so that an essentially non-continuous dosage of fluid is delivered by the pump.

51. (Original) The apparatus of claim 50, wherein the drive circuit changes dynamically the drive signal whereby the drive signal varies over time so that an essentially non-continuous intermittent dosage of fluid is delivered by the pump.

52. (Original) The apparatus of claim 48, wherein the drive circuit changes dynamically a shape of a waveform of the drive signal.

53. (Original) The apparatus of claim 48, wherein the drive signal comprises charge packets which are integrated by the piezoelectric actuator.

54. (Original) The apparatus of claim 48, wherein the drive circuit comprises a pulse width modulator which changes dynamically, during real time operation of the device, widths of pulses from which the drive signal is derived.

55. (Cancelled)

56. (Cancelled)

57. (Currently Amended) The apparatus of claim ~~5648~~, wherein the sensed operational parameter of the device is resonance of the piezoelectric actuator.

58. (Currently Amended) The apparatus of claim ~~5648~~, wherein the sensed operational parameter of the device is temperature.

59. (Original) The apparatus of claim 48, wherein the drive circuit changes dynamically the drive signal in dependence upon a sensor signal which is obtained from a sensor.

60. (Original) The apparatus of claim 59, wherein the sensor signal bears an indication of resonance of the piezoelectric actuator.

61. (Original) The apparatus of claim 59, wherein the sensor signal bears an indication of temperature.

62. (Original) The apparatus of claim 48, wherein the drive circuit changes dynamically one of voltage and frequency of the drive signal.

63. (Original) The apparatus of claim 48, wherein the drive circuit changes dynamically one of voltage and frequency of the drive signal in accordance with an input signal to the drive circuit.

64. (Original) The apparatus of claim 63, wherein the input signal is obtained from a user input device.

65. (Withdrawn) A piezoelectric-actuated device comprising:

a piezoelectric which is responsive to a digital drive signal; and

a drive circuit which produces the drive signal, the drive circuit being arranged to generate the drive signal in accordance with an analog input signal to the drive circuit.

66. (Withdrawn) The apparatus of claim 65, wherein the device is a pump comprising a pump body for at least partially defining a pumping chamber, and wherein the piezoelectric actuator is situated in the pump body and responsive to the digital drive signal for pumping fluid in the pumping chamber.

67. (Withdrawn) The apparatus of claim 65, wherein the drive circuit is arranged to change dynamically the drive signal in accordance with the analog input signal to the drive circuit.

68. (Withdrawn) The apparatus of claim 65, wherein the analog input signal to the drive circuit is acquired from a sensor.

69. (Withdrawn) The apparatus of claim 59, wherein the analog input signal bears an indication of resonance of the piezoelectric actuator.

70. (Withdrawn) The apparatus of claim 59, wherein the analog input signal bears an indication of temperature.

71. (Withdrawn) The apparatus of claim 65, wherein the analog input signal bears an indication of one of a desired voltage and a desired frequency of the drive signal.

72. (Withdrawn) The apparatus of claim 71, wherein the input signal is obtained from a user input device.

73. (Withdrawn) A piezoelectric-actuated device comprising:

a piezoelectric actuator which is responsive to a drive signal; and

a drive circuit which produces the drive signal, the drive circuit being arranged to generate the drive signal in dependence upon an operational parameter of the device.

74. (Withdrawn) The apparatus of claim 73, wherein the device is a pump having a pump body for at least partially defining a pumping chamber, wherein the piezoelectric actuator is situated in the pump body and responsive to the drive signal for pumping fluid in the pumping chamber.

75. (Withdrawn) The apparatus of claim 73, wherein the drive circuit dynamically shapes the waveform of the drive signal in dependence upon the operational parameter of the pump during real time operation of the device.

76. (Withdrawn) The apparatus of claim 73, wherein the drive signal comprises charge packets which are integrated by the piezoelectric actuator.

77. (Withdrawn) The apparatus of claim 73, wherein the drive circuit comprises a pulse width modulator which shapes widths of pulses of the waveform of the drive signal in dependence upon the operational parameter of the device.

78. (Withdrawn) The apparatus of claim 73, wherein the drive circuit shapes the waveform of the drive signal in dependence upon a sensed operational parameter of the device.

79. (Withdrawn) The apparatus of claim 78, wherein the sensed operational parameter of the pump is resonance of the piezoelectric actuator.

80. (Withdrawn) The apparatus of claim 78, wherein the sensed operational parameter of the device is temperature.

81. (Withdrawn) A piezoelectric-actuated device comprising:
a piezoelectric actuator which is responsive to a drive signal;
a sensor which generates a sensor signal; and
a drive circuit which produces the drive signal, the drive circuit being arranged to generate the drive signal in dependence upon the sensor signal.

82. (Withdrawn) The apparatus of claim 81, wherein the device is a pump comprising a pump body for at least partially defining a pumping chamber, wherein the piezoelectric actuator is situated in the pump body and responsive to the drive signal for pumping fluid in the pumping chamber.

83. (Withdrawn) The apparatus of claim 81, wherein the drive circuit dynamically shapes the waveform of the drive signal in dependence upon the operational parameter of the pump during real time operation of the device.

84. (Withdrawn) The apparatus of claim 81, wherein the drive signal comprises charge packets which are integrated by the piezoelectric actuator.

85. (Withdrawn) The apparatus of claim 81, wherein the drive circuit comprises a pulse width modulator which shapes widths of pulses of the waveform of the drive signal in dependence upon the sensor signal.

86. (Withdrawn) The apparatus of claim 81, wherein the sensor signal bears an indication of resonance of the piezoelectric actuator.

87. (Withdrawn) The apparatus of claim 81, wherein the sensor signal bears an indication of temperature.

88. (Withdrawn) The apparatus of claim 81, wherein the sensor signal bears an indication of voltage.

89. (Withdrawn) The apparatus of claim 81, wherein the drive circuit changes voltage of the drive signal in accordance with the input to the drive circuit.

90. (Withdrawn) A piezoelectric-actuated device comprising:

a piezoelectric actuator which is responsive to a drive signal; and

a drive circuit which produces the drive signal, the drive circuit being arranged to generate the drive signal whereby one of voltage and frequency of the drive signal is determined in dependence upon an input signal to the drive circuit.

91. (Previously Presented) The apparatus of claim 63, wherein the device is a pump comprising a pump body for at least partially defining a pumping chamber, and wherein the piezoelectric actuator is situated in the pump body and responsive to the drive signal for pumping fluid in the pumping chamber.

92. (Cancelled)

93. (Original) The apparatus of claim 63, wherein the drive circuit dynamically changes the one of voltage and frequency of the drive signal during real time operation of the device.

94. (Original) The apparatus of claim 63, wherein the drive signal comprises charge packets which are integrated by the piezoelectric actuator.

95. (Withdrawn) A piezoelectric-actuated device comprising:

a piezoelectric actuator which is responsive to a drive signal; and

a drive circuit which produces the drive signal, the drive circuit being arranged to generate the drive signal whereby the drive signal varies over time so that the device is operated essentially non-continuously.

96. (Withdrawn) The apparatus of claim 95, wherein the device is a pump comprising a pump body for at least partially defining a pumping chamber, and wherein the piezoelectric actuator is situated in the pump body and responsive to the drive signal for pumping fluid in the pumping chamber; and wherein the drive signal varies over time so that an essentially non-continuous dosage of fluid is delivered by the pump.

97. (Withdrawn) The apparatus of claim 96, wherein the drive circuit dynamically changes the drive signal over time during real time operation of the pump whereby a differing dosage of fluid is delivered by the pump after the change.

98. (Withdrawn) The apparatus of claim 95, wherein the drive signal comprises charge packets which are integrated by the piezoelectric actuator.

99. (Withdrawn) The apparatus of claim 95, wherein the drive circuit comprises a pulse width modulator which shapes widths of pulses of the waveform of the drive signal so that the drive signal varies over time.

100. (Currently Amended) A method of operating a device having a piezoelectric actuator which is responsive to a drive signal, the method comprising:

dynamically changing the drive signal in dependence upon a sensed operational parameter of the device during real time operation of the device;

actuating the piezoelectric actuator in response to the drive signal.

101. (Original) The method of claim 100, further comprising dynamically changing the drive signal whereby the drive signal varies over time so that the device operates on an essentially non-continuous basis.

102. (Previously Presented) The method of claim 100, wherein the device is a pump and the piezoelectric actuator is situated in a pump body and responsive to the drive signal for pumping fluid in the pumping chamber, and wherein the method further comprises:

dynamically changing the drive signal during real time operation of the pump;

actuating the piezoelectric actuator in response to the drive signal to pump the fluid in the pumping chamber.

103. (Original) The method of claim 102, further comprising dynamically changing the drive signal whereby the drive signal varies over time so that an essentially non-continuous dosage of fluid is delivered by the pump.

104. (Original) The method of claim 103, further comprising dynamically changing the drive signal whereby the drive signal varies over time so that an essentially non-continuous intermittent dosage of fluid is delivered by the pump.

105. (Original) The method of claim 100, wherein the method comprises dynamically changing a shape of a waveform of the drive signal.

106. (Original) The method of claim 100, wherein the drive signal comprises charge packets which are integrated by the piezoelectric actuator.

107. (Original) The method of claim 100, further comprising using a pulse width modulator for dynamically changing, during real time operation of the pump, widths of pulses from which the drive signal is derived.

108. (Cancelled)

109. (Cancelled)

110. (Currently Amended) The method of claim ~~109~~100, wherein the sensed operational parameter of the pump is resonance of the piezoelectric actuator.

111. (Currently Amended) The method of claim ~~109~~100, wherein the sensed operational parameter is temperature.

112. (Original) The method of claim 100, further comprising dynamically changing the drive signal in dependence upon a sensor signal which is obtained from a sensor.

113. (Original) The method of claim 112, wherein the sensor signal bears an indication of resonance of the piezoelectric actuator.

114. (Original) The method of claim 112, wherein the sensor signal bears an indication of temperature.

115. (Original) The method of claim 100, further comprising dynamically changing one of voltage and frequency of the drive signal.

116. (Original) The method of claim 100, further comprising dynamically changing one of voltage and frequency of the drive signal in accordance with an input signal to the drive circuit.

117. (Original) The method of claim 116, further comprising obtaining the input signal from a user input device.

118. (Withdrawn) A method of operating a device having a piezoelectric actuator which is responsive to a drive signal , the method comprising:

generating the drive signal in accordance with an analog input signal to the drive circuit;

actuating the piezoelectric actuator in response to the drive signal.

119. (Withdrawn) The method of claim 118, wherein the device is a piezoelectric pump having the piezoelectric actuator situated in a pump body and responsive to the drive signal for pumping fluid in the pumping chamber, and wherein the method further comprises actuating the piezoelectric actuator in response to the drive signal to pump the fluid in the pumping chamber.

120. (Withdrawn) The method of claim 118, further comprising dynamically changing the drive signal in accordance with the analog input signal to the drive circuit.

121. (Withdrawn) The method of claim 118, further comprising acquiring the analog input signal to the drive circuit from a sensor.

122. (Withdrawn) The method of claim 121, wherein the analog input signal bears an indication of resonance of the piezoelectric actuator.

123. (Withdrawn) The method of claim 121, wherein the analog input signal bears an indication of temperature.

124. (Withdrawn) The method of claim 118, wherein the analog input signal bears an indication of one of a desired voltage and a desired frequency of the drive signal.

125. (Withdrawn) The method of claim 124, further comprising obtaining the input signal from a user input device.

126. (Withdrawn) A method of operating a device having a piezoelectric actuator which is responsive to a drive signal, the method comprising:

generating the drive signal in dependence upon an operational parameter of the device;

actuating the piezoelectric actuator in response to the drive signal.

127. (Withdrawn) The method of claim 126, wherein the device is a piezoelectric pump having the piezoelectric actuator situated in a pump body and responsive to the

drive signal for pumping fluid between an inlet and an outlet of the pump body, and wherein the method further comprises actuating the piezoelectric actuator in response to the drive signal to pump the fluid between the inlet and the outlet of the pump body.

128. (Withdrawn) The method of claim 126, further comprising dynamically shaping the waveform of the drive signal in dependence upon the operational parameter of the device during real time operation of the device.

129. (Withdrawn) The method of claim 126, wherein the drive signal comprises charge packets which are integrated by the piezoelectric actuator.

130. (Withdrawn) The method of claim 126, further comprising using a pulse width modulator to shape widths of pulses of the waveform of the drive signal in dependence upon the operational parameter of the device.

131. (Withdrawn) The method of claim 126, further comprising the drive circuit shaping the waveform of the drive signal in dependence upon a sensed operational parameter of the device.

132. (Withdrawn) The method of claim 131, wherein the sensed operational parameter of the device is resonance of the piezoelectric actuator.

133. (Withdrawn) The method of claim 131, wherein the sensed operational parameter is temperature.

134. (Withdrawn) A method of operating a device having a piezoelectric actuator which is responsive to a drive signal , the method comprising:

generating the drive signal in dependence upon a sensor signal;

actuating the piezoelectric actuator in response to the drive signal.

135. (Withdrawn) The method of claim 134, wherein the device is a piezoelectric pump having the piezoelectric actuator situated in a pump body and responsive to the

drive signal for pumping fluid between an inlet and an outlet of the pump body, and wherein the method further comprises actuating the piezoelectric actuator in response to the drive signal to pump the fluid between the inlet and the outlet of the pump body.

136. (Withdrawn) The method of claim 134, further comprising dynamically shaping the waveform of the drive signal in dependence upon a sensor signal during real time operation of the device.

137. (Withdrawn) The method of claim 134, wherein the drive signal comprises charge packets which are integrated by the piezoelectric actuator.

138. (Withdrawn) The method of claim 134, further comprising using a pulse width modulator for shaping widths of pulses from which the waveform of the drive signal is derived in dependence upon the sensor signal.

139. (Withdrawn) The method of claim 134, wherein the sensor signal bears an indication of resonance of the piezoelectric actuator.

140. (Withdrawn) The method of claim 134, wherein the sensor signal bears an indication of temperature.

141. (Withdrawn) The method of claim 134, wherein the sensor signal bears an indication of voltage.

142. (Withdrawn) The method of claim 134, further comprising the drive circuit changing voltage of the drive signal in accordance with the input to the drive circuit.

143. (Withdrawn) A method of operating a device having a piezoelectric actuator which is responsive to a drive signal, the method comprising:

generating the drive signal whereby one of voltage and frequency of the drive signal is determined in dependence upon an input signal to the drive circuit;

actuating the piezoelectric actuator in response to the drive signal

144. (Withdrawn) The method of claim 143, wherein the device is a piezoelectric pump having the piezoelectric actuator situated in a pump body and responsive to the drive signal for pumping fluid in the pumping chamber, and wherein the method further comprises actuating the piezoelectric actuator in response to the drive signal to pump the fluid in the pumping chamber.

145. (Withdrawn) The method of claim 143, further comprising obtaining the input signal from a user input device.

146. (Withdrawn) The method of claim 143, further comprising dynamically changing the one of voltage and frequency of the drive signal during real time operation of the device.

147. (Withdrawn) The method of claim 143, wherein the drive signal comprises charge packets which are integrated by the piezoelectric actuator.

148. (Withdrawn) A method of operating a device having a piezoelectric actuator which is responsive to a drive signal, the method comprising varying the drive signal varies over time so that the device operates essentially non-continuously.

149. (Withdrawn) The method of claim 148, wherein the device is a piezoelectric pump having the piezoelectric actuator situated in a pump body and responsive to the drive signal for pumping fluid between an inlet and an outlet of the pump body, and wherein the method further comprises varying the drive signal varies over time so that an essentially non-continuous dosage of fluid is delivered by the pump.

150. (Withdrawn) The method of claim 149, further comprising dynamically changing the drive signal over time during real time operation of the pump whereby a differing dosage of fluid is delivered by the pump after the change.

151. (Withdrawn) The method of claim 148, wherein the drive signal comprises charge packets which are integrated by the piezoelectric actuator.

152. (Withdrawn) The method of claim 148, further comprising using a pulse width modulator for shaping widths of pulses of the waveform of the drive signal so that the drive signal varies over time.